

## **IN THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application. An identifier indicating the status of each claim is provided.

### **Listing of Claims**

1. (Currently Amended) A fingerprint information processing apparatus comprising:

first detection means for detecting from a fingerprint image first feature points which are either ridge bifurcations or ridge endings of a fingerprint;

second detection means for detecting a center point which is a center of a registered image;

determination means for determining ~~a distance~~ distances between the center point and each of the plurality of first feature points;

sorting means for sorting the first feature points ~~on the basis in order~~ of the distance determined by the determination means;

first generation means for generating a ~~triangle which connects~~ plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points,

~~wherein the first generation means uses the sorted first feature points to generate the triangle~~ in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

first calculation means for calculating an area and a length of each side of the triangle generated by the first generation means; and

storage means for storing the area and the length of each side of the triangle calculated by the first calculation means.

2. (Canceled)

3. (Previously Presented) The information processing apparatus as described in claim 1, wherein:

the first detection means further detects second feature points which are between the ridge bifurcations and the ridge endings, and

further including:

second calculation means for calculating:

at least one of a distance and a direction between a first point and a fourth point which is the one of the second feature points that is closest to the first point,

at least either a distance and a direction between a second point and a fifth point which is the one of the second feature points that is closest to the second point, and

at least one of a distance and a direction between a third point and a sixth point which is the one of the second feature points that is closest to the third point and the three first feature points which constitute the one triangle are, respectively, the first point, the second point and the third point;

the storage means further stores at least one of the distance and the direction calculated by the second calculation means, between the first point and the fourth point, between the second point and the fifth point, and between the third point and the sixth point.

4. (Previously Presented) The information processing apparatus as described in claim 3, wherein

the second calculation means calculates at least one of the distance and the direction between the first point and the fourth point, between the second point and the fifth point, and between the third point and the sixth point by using the sorted second feature points.

5. (Previously Presented) The information processing apparatus as described in claim 1, further comprising:

second calculation means for calculating an area and a length of each side of the triangle generated by the second generation means; and

comparison means for comparing an area and a length of each side of the triangle stored in the storage means with the area and the length of each side of the triangle of the fingerprint image subject to collation calculated by the second calculation means.

6. (Currently Amended) An information processing method comprising:

a first detection step of detecting, utilizing a first detection means, from a fingerprint image first feature points which are either ridge bifurcations or ridge endings of a fingerprint;

a second detection step of detecting, utilizing a second detection means, a center point, which is a center of a registered image;

a determination step of determining, utilizing a determination means, ~~a distance~~ distances between the center point and each of the plurality of first feature points;

a sorting step of sorting, utilizing a sorting means, the first feature points ~~on the basis in order~~ of the distance determined in the determination step;

a first generation step of generating, utilizing a generation means, ~~a triangle which connects plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points, the generating being a function of the sorted first feature points~~

wherein in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

a first calculation step of calculating, utilizing a calculation means, an area and a length of each side of the triangle generated by the processing of the first generation step; and

a storage control step of ~~controlling storage of~~ storing, utilizing a storage means, the area and the length of each side of the triangle calculated by the processing of the first calculation step.

7. (Currently Amended) A computer-readable medium for storing a program recorded on a recording medium the program comprising:

a first detection step of detecting from a fingerprint image first feature points which are either ridge bifurcations or ridge endings of a fingerprint;

a second detection step of detecting a center point, which is a center of a registered image;

a determination step of determining ~~a distance~~ distances between the center point and each of the plurality of first feature points;

a sorting step of sorting the first feature points ~~on the basis in order~~ of the distance determined in the determination step;

a first generation step of generating a ~~triangle which connects plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points, the generating being a function of the sorted first feature points~~

wherein in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

a first calculation step of calculating an area and a length of each side of the triangle generated by the processing of the first generation step; and

a storage control step of controlling storage of the area and the length of each side of the triangle calculated by the processing of the first calculation step.

8. (Currently Amended) A program encoded on a computer-readable medium, comprising the steps of:

detecting from a fingerprint image first feature points which are one of ridge bifurcations and ridge endings of a fingerprint;

detecting a center point, which is a center of a registered image;

determining ~~a distance~~ distances between the center point and each of the plurality of first feature points;

sorting the first feature points ~~on the basis~~ in order of the distance determined in the determining step;

generating a ~~triangle which connects~~ plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points, as a function of the sorted first feature points,

wherein in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

calculating an area and a length of each side of the triangle generated by the processing of the first generation step; and

storing the area and the length of each side of the triangle calculated by the processing of the first calculation step.

9. (Currently Amended) An information processing apparatus comprising:

first detection means for detecting first feature points which are either ridge bifurcations or ridge endings of a fingerprint from a registered fingerprint image subject to collation;

second detection means for detecting a center point of the registered fingerprint image;

determination means for determining ~~a distance~~ distances between the center point and each of the plurality of first feature points;

sorting means for sorting the first feature points ~~on the basis~~ in order of the distance determined by the determination means;

first generation means for generating a ~~triangle which connects~~ plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points,

~~wherein the first generation means uses the sorted first feature points to generate the triangle~~ in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

first calculation means for calculating an area and a length of each side of the triangle generated by the first generation means; and

comparison means for comparing the area and the length of each side of the triangle of the fingerprint image subject to collation, which are calculated by the first calculation means, with an area and a length of each side of a triangle of a fingerprint image previously stored.

10. (Previously Presented) The information processing apparatus as described in claim 9, wherein:

the first detection means further detects second feature points which are other ones of the ridge bifurcations and the ridge endings; and

further includes second calculation means for calculating at least one of:

a distance or a direction between a first point and a fourth point which is the one of the second feature points that is closest to the first point,

at least one of a distance and a direction between a second point and a fifth point which is the one of the second feature points that is closest to the second point, and

at least one of a distance and a direction between a third point and a sixth point which is the one of the second feature points that is closest to the third point, and

wherein the three first feature points which constitute the one triangle are, respectively, the first point, the second point and the third point; and

the comparison means compares an area and a length of each side of the triangle of the fingerprint image subject to collation, which are calculated by the first calculation means and the second calculation means, as well as at least one of the distance and the direction of the fourth point relative to the first point, of the fifth point relative to the second point, and of the sixth point relative to the third point, with an area and a length of each side of the triangle of the stored fingerprint image as well as at least one of the distance and the direction of the fourth point relative to the first point, of the fifth point relative to the second point, and of the sixth point relative to the third point of the fingerprint image subject to collation.

11. (Currently Amended) A fingerprint information processing method comprising:



a first detection step of detecting, utilizing a first detection means, first feature points which are one of ridge bifurcations or ridge endings of a fingerprint, from a registered fingerprint image subject to collation;

a second detection step of detecting, utilizing a second detection means, a center point, which is a center of the registered fingerprint image;

a determination step of determining, utilizing a determination means, a ~~distance~~ distances between the center point and each of the plurality of first feature points;

a sorting step of sorting, utilizing a sorting means, the first feature points ~~on the basis in order~~ of the distance determined in the determination step;

a first generation step of generating, utilizing a generation means, ~~a triangle which connects plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points, the generating being a function of the sorted first feature points~~

wherein in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

a first calculation step of calculating, utilizing a calculation means, an area and a length of each side of the triangle generated by the processing of the first generation step; and

a comparison step of comparing, utilizing a comparison means, the area and the length of each side of the triangle of the fingerprint image subject to collation, which are calculated by the first calculation means, with an area and a length of each side of a triangle of a fingerprint image previously stored.

12. (Canceled)

13. (Currently Amended) A computer-readable medium for storing a fingerprint information processing computer-executable program comprising:

a first detection step of detecting first feature points which are one of ridge bifurcations or ridge endings of a fingerprint, from a registered fingerprint image subject to collation;

a second detection step of detecting a center point, which is a center of the registered fingerprint image;

a determination step of determining a ~~distance~~ distances between the center point and each of the plurality of first feature points;

a sorting step of sorting the first feature points ~~on the basis in order~~ of the distance determined in the determination step;

a first generation step of generating a ~~triangle which connects plurality of triangles, each triangle connecting three arbitrary points close to one another from among selected from the plurality of first feature points, the generating being a function of the sorted first feature points~~

wherein in each triangle, the three points include a first point which is selected from the sorted first feature points sorted by the sorting means, in order of increasing distance from the center point, and a second point which is closest to the first point in the triangle, and a third point which is second closest to the first point in the triangle;

a first calculation step of calculating an area and a length of each side of the triangle generated by the processing of the first generation step; and

a comparison step of comparing the area and the length of each side of the triangle of the fingerprint image subject to collation, which are calculated by the first calculation means, with an area and a length of each side of a triangle of a fingerprint image previously stored.